GEOTHERMAL ROYALTIES

5/4/93

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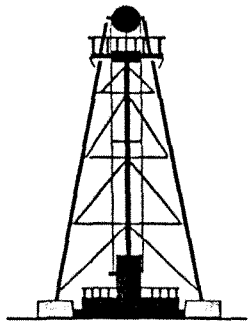

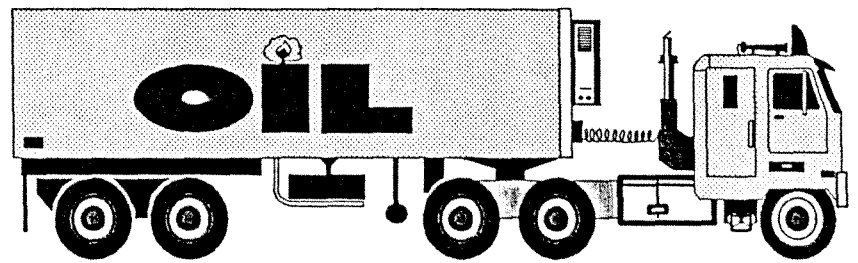
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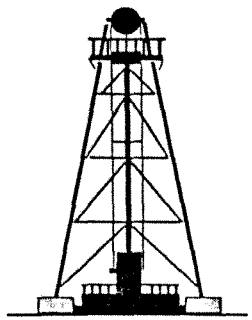

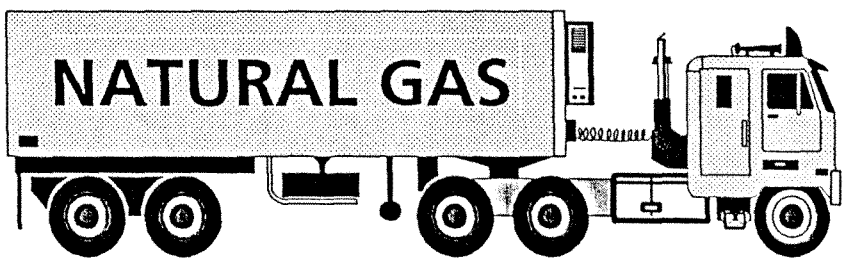
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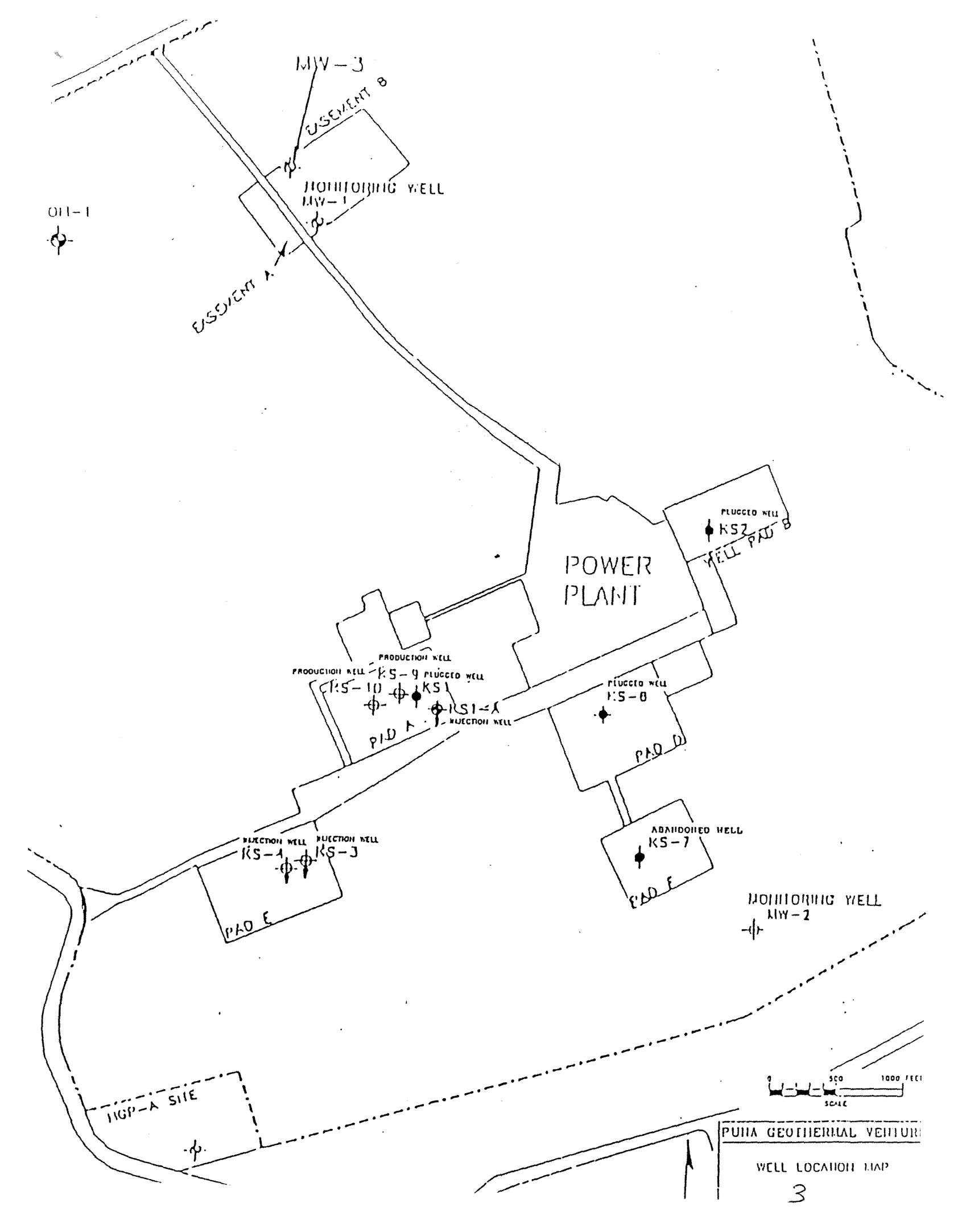
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AUTHORITY

HRS Chapter 182

- BLNR issues mining leases
- Royalty due State of Hawaii
- BLNR sets royalty
- 30% royalty due County
- BLNR may provide royalty waiver up to 8 years

HRS Chapter 10

- 20% of all funds from public land trust to OHA

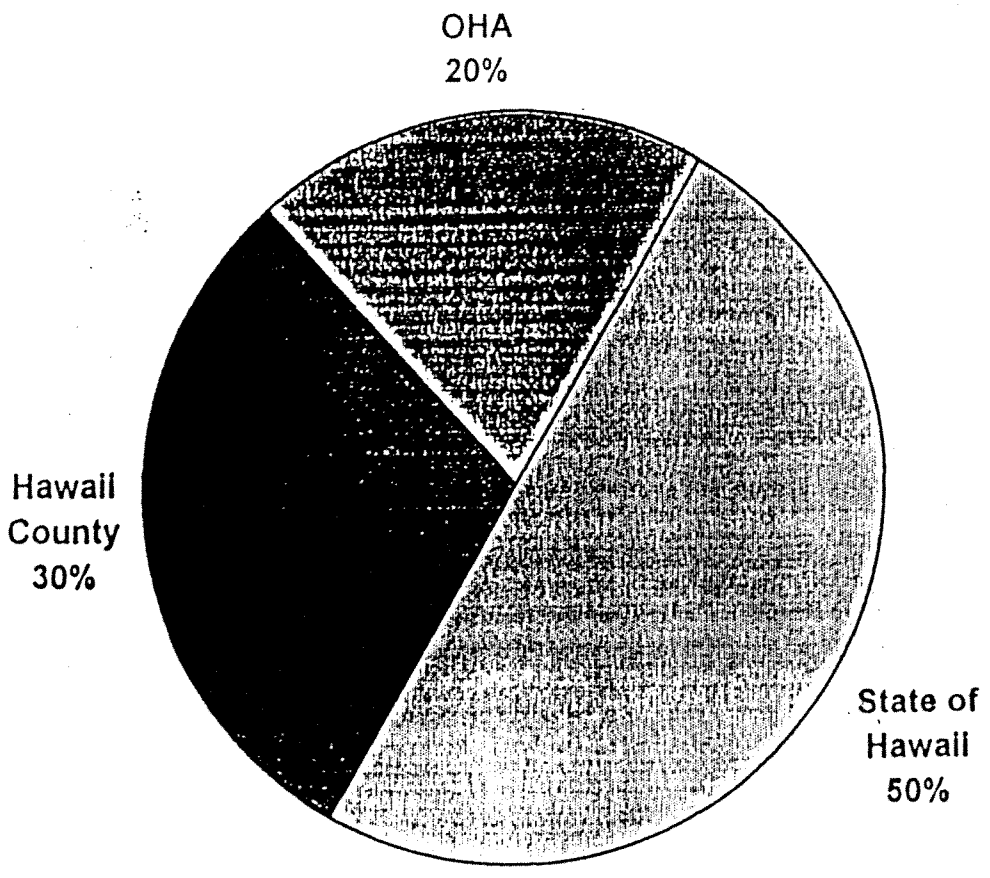
Administrative Rules Chapter 183

- Geothermal mining leases
- Royalty rate between 10 and 20%
- BLNR sets valuation method

Mining leases R-1, R-2, R-3, R-4, R-5 and S-4602

- BLNR set royalty rate at 10%

ROYALTY SHARING



ROYALTY CALCULATION

ROYALTY ($) = ROYALTY RATE (%) × RESOURCE VALUE ($)

ROYALTY RATE

Royalty Rate = 10%

(Set by Board in Mining Leases)

RESOURCE VALUE

- Percentage of Proceeds Method
- Netback Method

PERCENTAGE OF PROCEEDS METHOD

ELECTRICITY REVENUES ($)	×	NEGOTIATED PERCENTAGE (%)	=	RESOURCE VALUE ($)

PERCENTAGE OF PROCEEDS METHOD FEATURES

- Used in 225 MW of electricity production in California and Nevada
- 35 - 50% industry range
- Proposals by PGV to use percentage of proceeds method to evaluate resource

EXAMPLE
PERCENTAGE OF PROCEEDS METHOD

Assumptions:

electricity revenues, first full year of production: $16,469,000

negotiated percentage: 35%

Formula:

electricity revenues ($) × negotiated percentage (%) = resource value ($)

$16,469,000 × 35% = $5,764,150

rounded to the nearest thousand dollars = $5,764,000

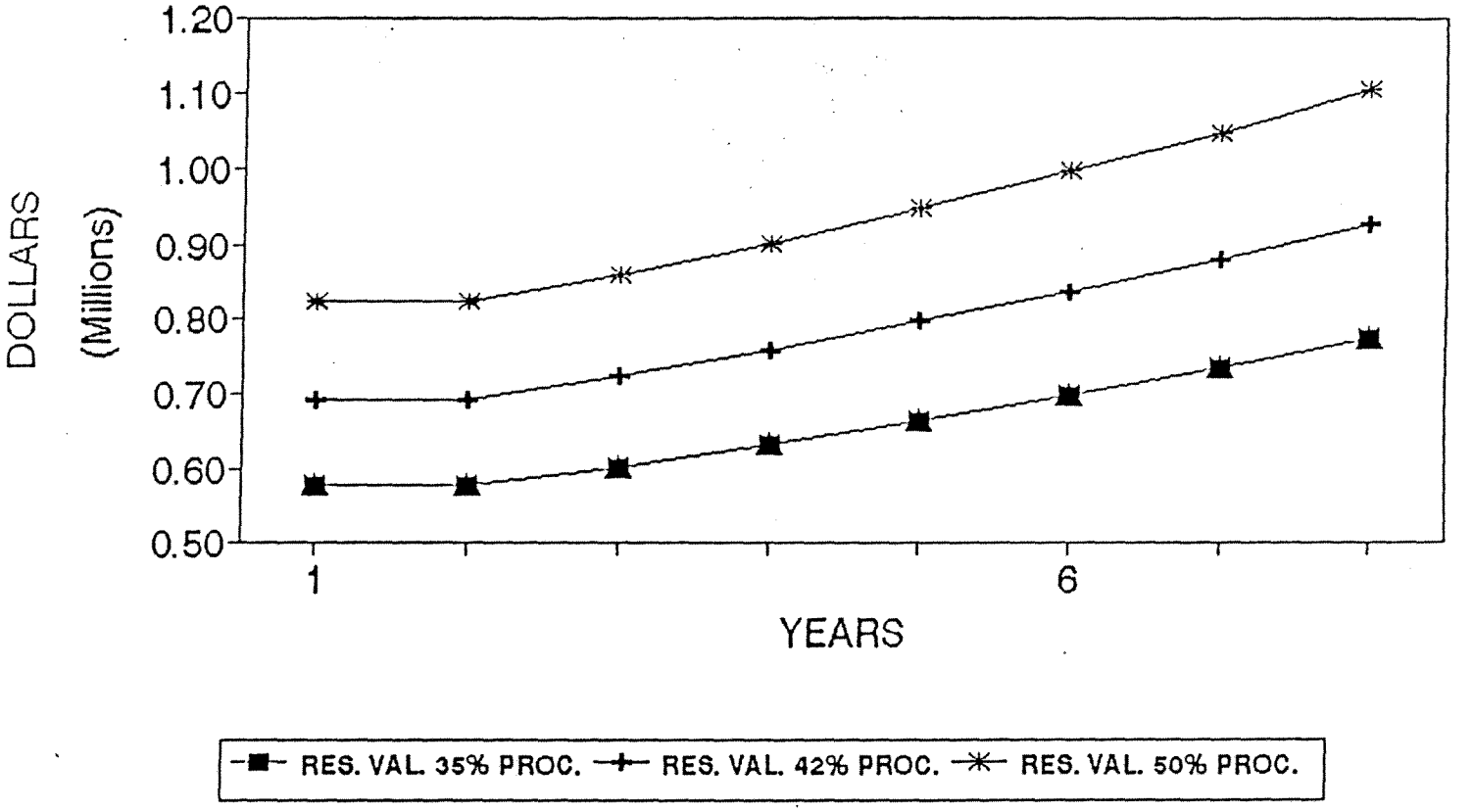
Formula:

resource value ($) × royalty rate (%) = royalty ($)

$5,764,000 × 10% = $576,400

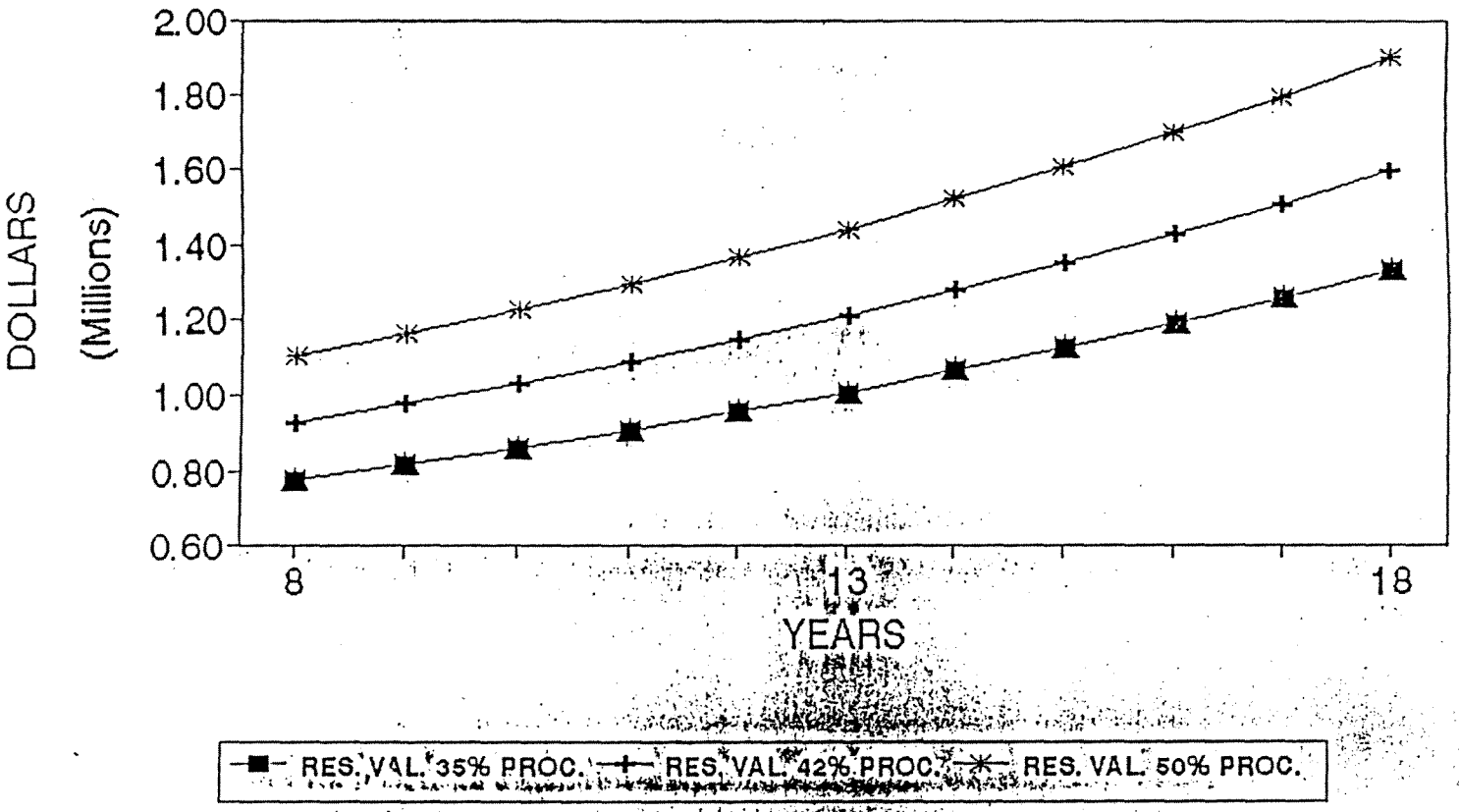
ROYALTY CALCULATIONS

PERCENTAGE OF PROCEEDS METHOD



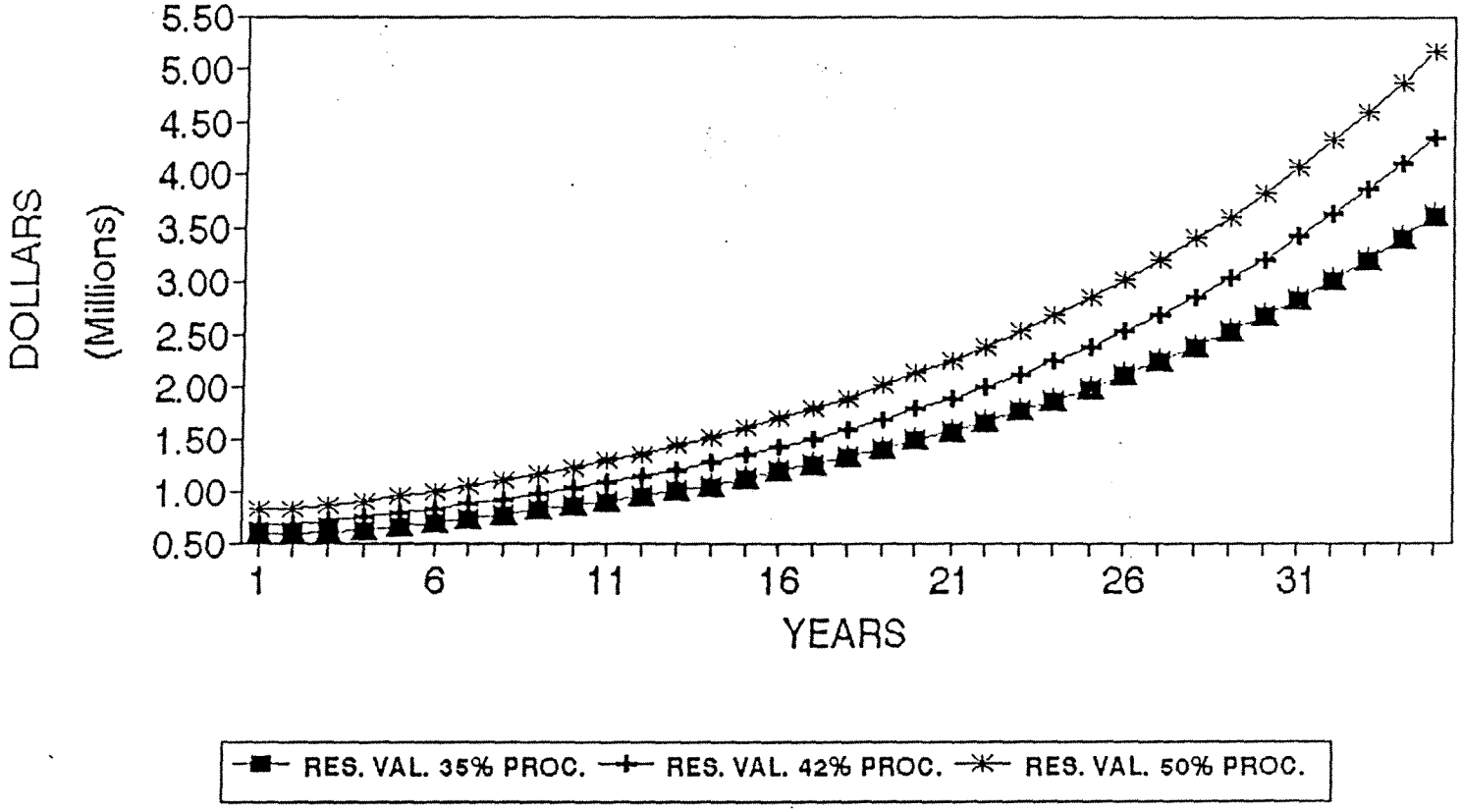
ROYALTY CALCULATIONS

PERCENTAGE OF PROCEEDS METHOD



ROYALTY CALCULATIONS

PERCENTAGE OF PROCEEDS METHOD



ROYALTY AMOUNTS FOR STATE, COUNTY AND OHA, PERCENTAGE OF PROCEEDS METHOD 35%

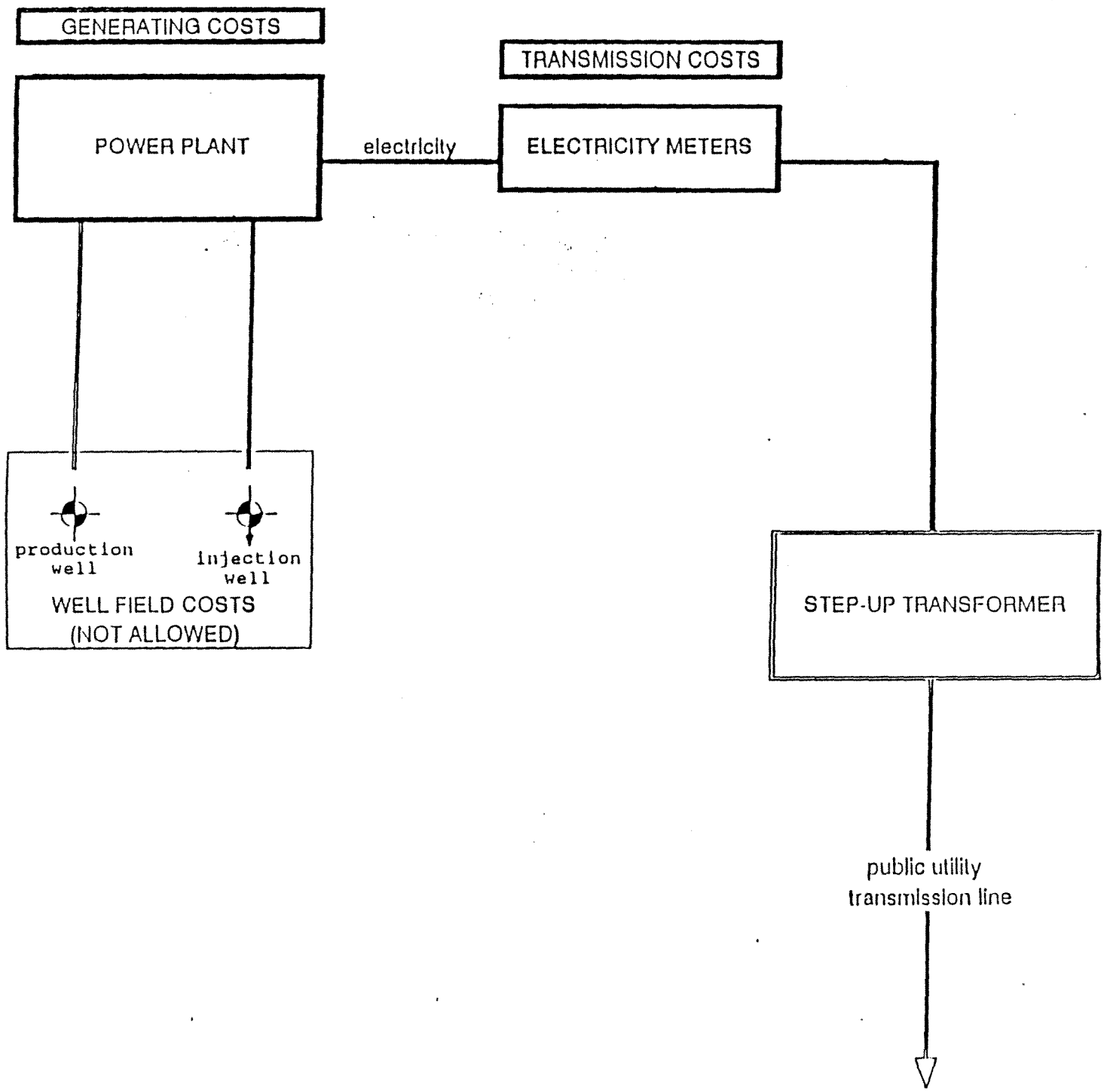
YEAR 1, YEAR 3, YEAR 8, YEAR 35

YEAR	STATE (50%)	COUNTY (30%)	OHA (20%)	TOTAL ROYALTY
1	288,000	173,000	115,000	576,000
3	301,000	181,000	120,000	602,000
8	387,000	232,000	155,000	773,000
35	1,809,000	1,085,000	723,000	3,617,000

NETBACK METHOD

ELECTRICITY REVENUES ($)	—	TRANSMISSION COSTS ($)	—	GENERATING COSTS ($)	=	RESOURCE VALUE ($)

NETBACK METHOD: GENERATING AND TRANSMISSION COSTS



NETBACK METHOD
ALLOWABLE AND NON-ALLOWABLE COSTS

ALLOWABLE COSTS:

TRANSMISSION COSTS:	CAPITAL COSTS, OPERATING AND DEPRECIATION EXPENSES
GENERATING COSTS:	CAPITAL COSTS, OPERATING AND DEPRECIATION EXPENSES

NON-ALLOWABLE COSTS:

STEAMFIELD COSTS

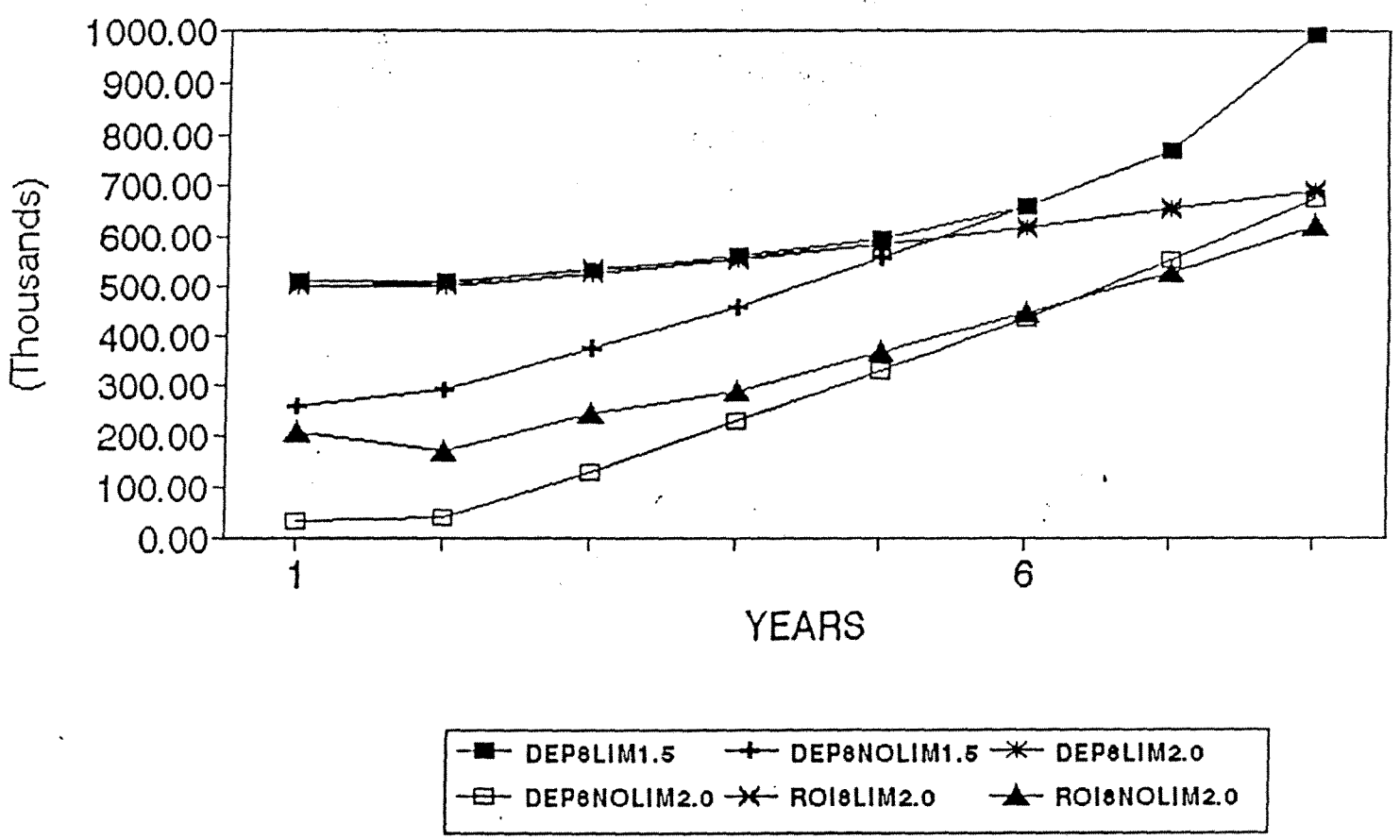
STATE AND FEDERAL TAXES

ROYALTIES

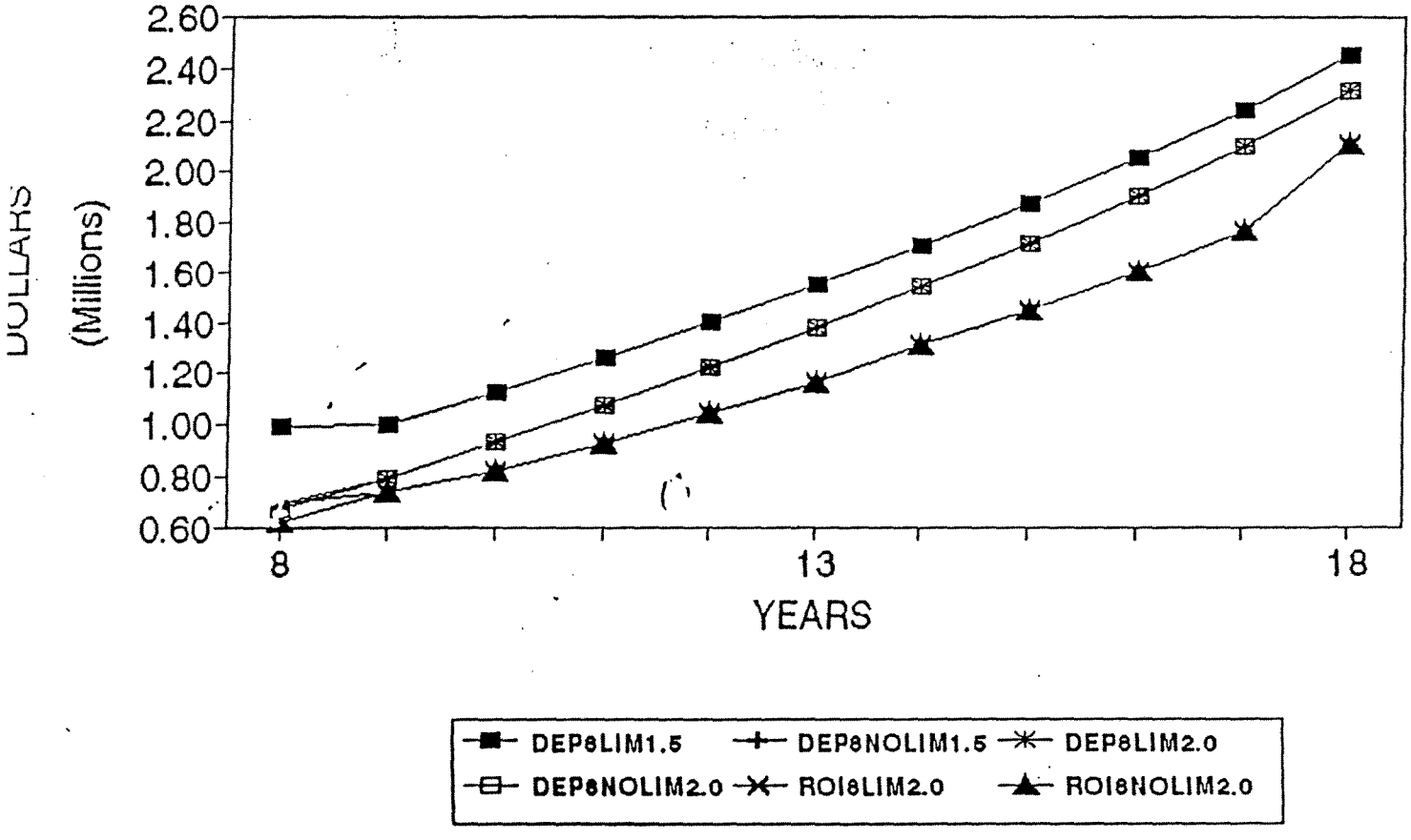
NETBACK METHOD KEY PARAMETERS

- Bond Rate
- Multiplier
- Limit on Cost Deductions
- Exclusion of Certain Costs
- Floor
- Depreciation or Return on Investment Methods

ROYALTY CALCULATIONS
VARIOUS METHODS



ROYALTY CALCULATIONS
VARIOUS METHODS



ROYALTY CALCULATIONS
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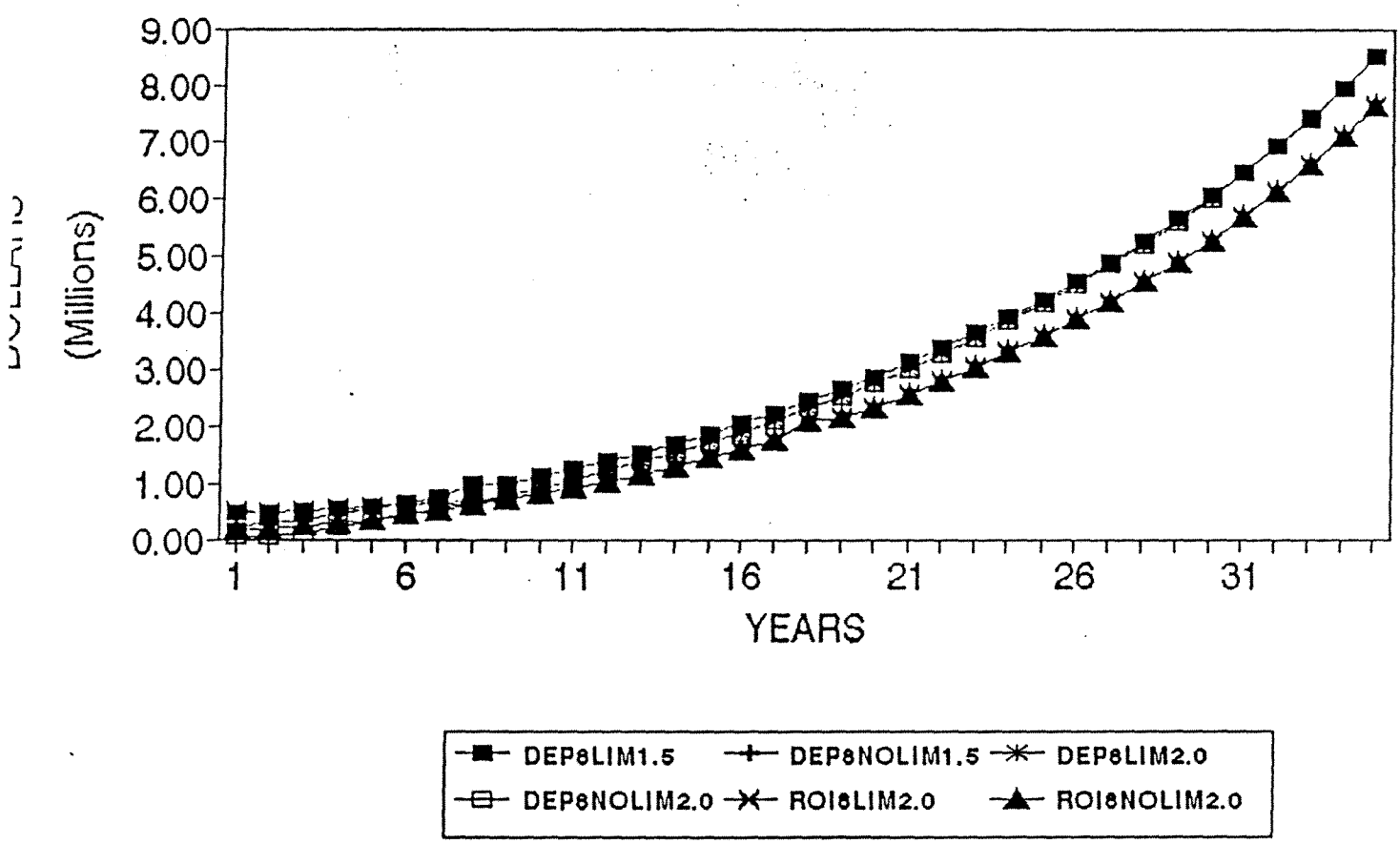
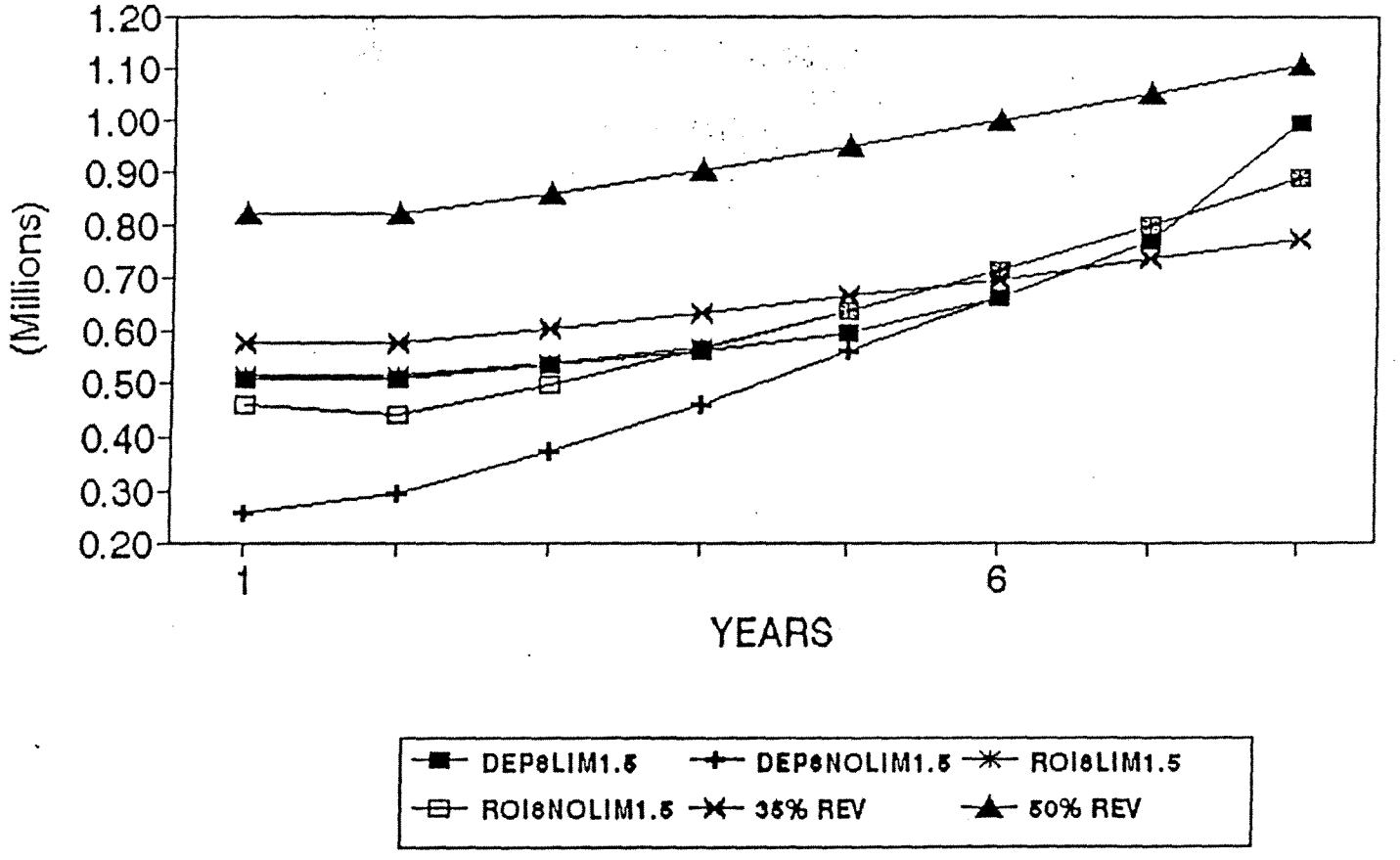


ROYALTY ESTIMATES,
YEARS 1, 3, 8, 35
NETBACK DEPRECIATION METHOD, BBB INDUSTRIAL BOND RATE 8%,
MULTIPLIER 1.5, 2/3 DEDUCTION LIMIT ON GENERATING EXPENSES

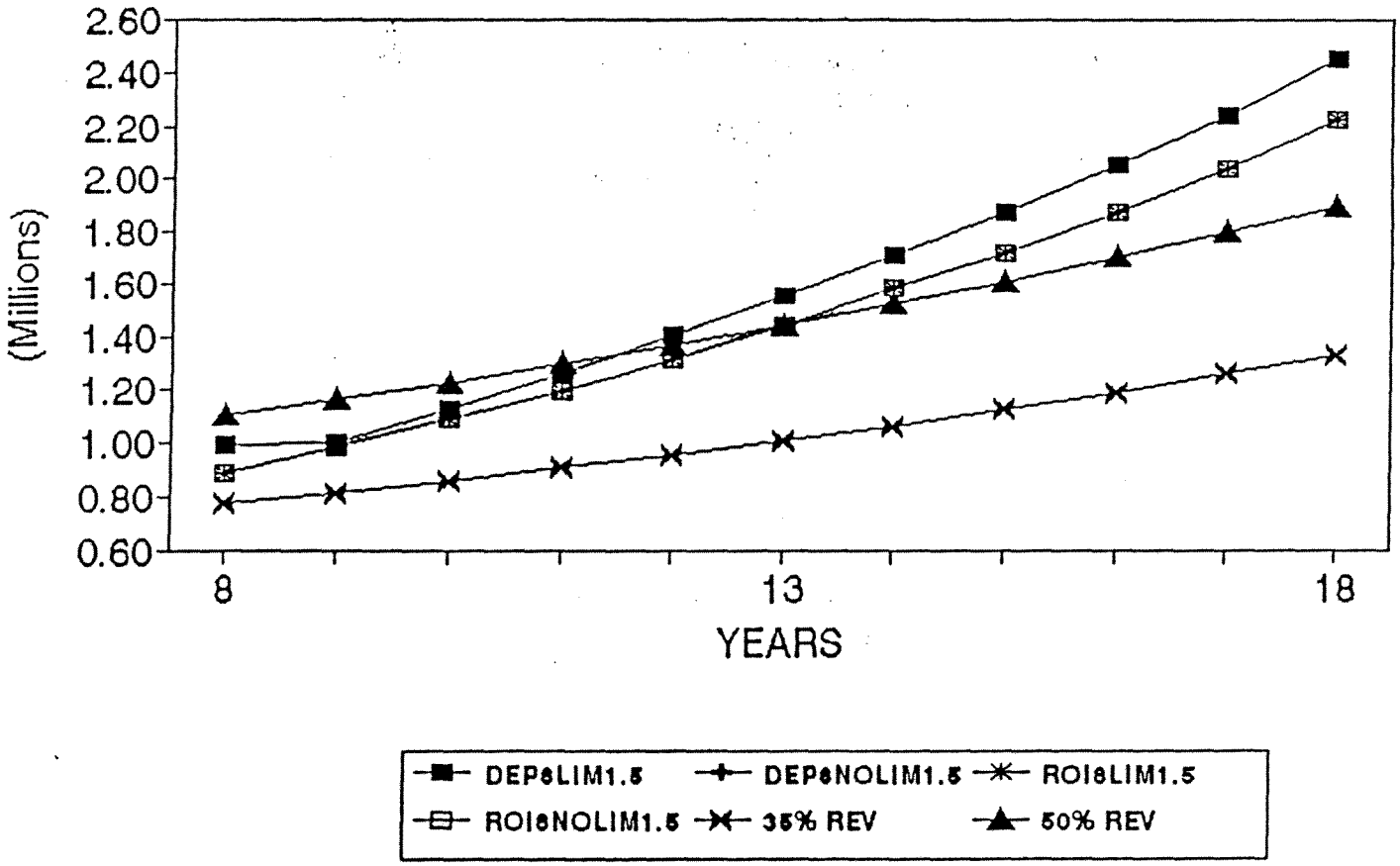
	STATE (50%)	COUNTY (30%)	OHA (20%)	TOTAL (100%)
YEAR ONE				
DEP.	254,462	152,677	101,785	508,924
YEAR THREE				
DEP.	267,066	160,240	106,826	534,132
YEAR EIGHT				
DEP.	495,622	297,373	198,249	991,244
YEAR THIRTY-FIVE				
DEP.	4,258,500	2,555,100	1,703,400	8,517,000

ROYALTY CALCULATIONS

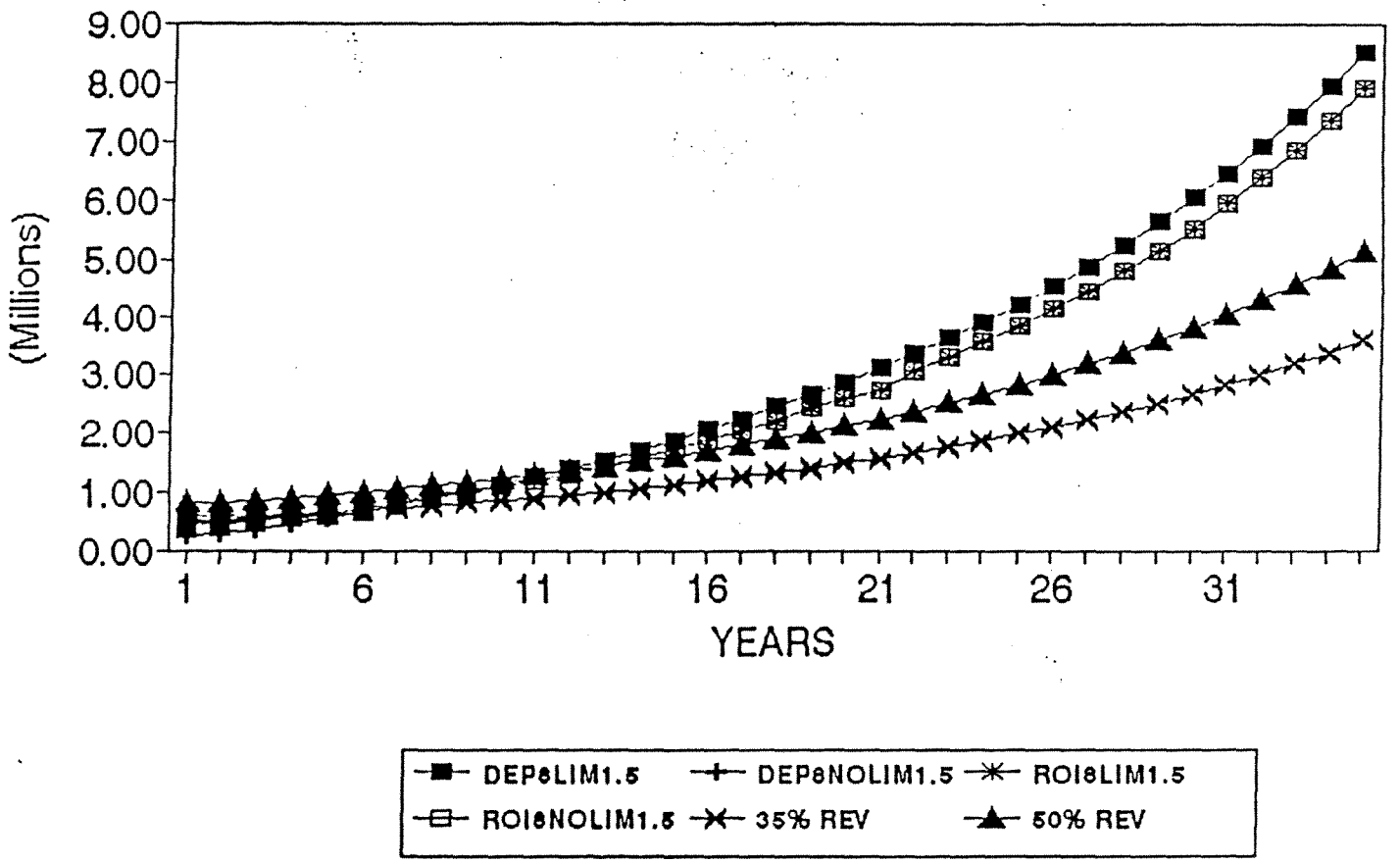
VARIOUS METHODS



ROYALTY CALCULATIONS
VARIOUS METHODS



ROYALTY CALCULATIONS
VARIOUS METHODS



COMPARISON OF METHODS

NETBACK

PRO

- Used by Federal Government
- Fair; protects state interests
- Recognizes developer risks
- Industry accepted
- Simple to calculate
- Yields most royalties long-term
- May eliminate need for walver
- Applies to all developments

CON

- Cost and expense info required
- Yields vary with bond rate, other parameters

PERCENTAGE OF PROCEEDS

PRO

- Simple to calculate

CON

- Arbitrary
- Lower yields long-term
- May require separate negotiations

SUMMARY

DLNR IS RECOMMENDING ADOPTING A MODIFIED NETBACK METHOD WITH A 1.5 MULTIPLIER AND DEDUCTIONS LIMITS. IT IS IN THE BEST INTEREST OF THE STATE TO USE THE NETBACK VALUATION METHOD THAT IS BEING USED BY THE MMS TO VALUE GEOTHERMAL RESOURCES PRODUCED FROM FEDERAL LEASES. THE NETBACK METHOD IS LOGICAL, IT CAN BE APPLIED CONSISTENTLY TO ALL DLNR PROJECTS AND THE MMS HAS SPENT CONSIDERABLE TIME AND EFFORT TO DEVELOP A METHOD THAT PROTECTS THE INTEREST OF THE RESOURCE OWNER WITHOUT BEING UNFAIR TO THE DEVELOPER. FOLLOWING THE LEAD OF THE MMS PROVIDES DLNR WITH AN ESTABLISHED, SUPPORTABLE AND CONSISTENT METHOD OF VALUING GEOTHERMAL RESOURCES.

DLNR STAFF PROPOSAL

UTILIZE NETBACK METHOD:

- Federal government uses netback method
- Netback method yields greatest royalties
- Netback method uniformly applicable
- Netback method based on actual expenses

RECOMMENDATION

That the Board authorize the Division to proceed to use the netback method to calculate the value of geothermal resources used in the production of electricity in "no sales" situations, and authorize the Chairperson to sign the appropriate documents requiring the lessee to submit the required financial statements, and that the Board authorize the Chairperson to modify the federal method as appropriate for State of Hawaii use.

TIMETABLE

8/90	NELH hires consultant Steve Morris regarding HGP-A steam sale; Morris presents direct sale and percentage of proceeds methods to DBED and DLNR staff
12/90	PGV requests 60% waiver of royalties for 8 years based on resource value of 33% of electricity revenues
2/91	DLNR hires Brad Mossman and Steve Morris to assist in royalty review - Morris recommends netback method
3/91	PGV proposed "proportion of profits" method; proposes 27% percentage of proceeds method as second choice; uses Perkins-Coie to lobby Washington on proposed netback rule changes
6/91	DLNR presents various royalty calculation methods to BLNR
11/91	new MMS netback rules promulgated that favor industry
3/92	MMS provides seminar on new rules; offers on-going assistance
7-8/92	DLNR presents information on royalties to BLNR, Hawaii County and OHA
4/93	DLNR to present information on royalties to Hawaii County Mayor and staff, Hawaii County Council, OHA and others for feedback to BLNR
5/93	Proposed action on resource valuation method to BLNR

NOTES ON GEOTHERMAL ROYALTY CALCULATIONS

7/6/92

Royalty Calculations

Contents

ROYALTY CALCULATION

History

1979-1987 State of Hawaii Board of Land and Natural Resources sets royalty rate at 10% for various geothermal mining leases

1/89 U.S. Department of the Interior Minerals Management Service (MMS) announces geothermal resource valuation rules to be updated

8/90 State of Hawaii Department of Business and Economic Development and Tourism 's Natural Energy Laboratory of Hawaii hires then independent consultant Steve Morris for consulting work re proposed sale of HGPA steam to PGV (Morris is now Vice President and General Manager of PGV)

12/90 PGV (Maurice Richard) requests 60% waiver of royalties for 8 years based on resource value of 33% electricity revenues - response pending Board action on resource valuation

early 1991 State of Hawaii Department of Land and Natural Resources DOWALD hires consultants Brad Mossman and Steve Morris to assist in royalty review

3/91 PGV proposes Proportion of Profits Method (uses Perkins Coie to lobby MMS through Geothermal Resources Association)

PGV proposes Percentage of Proceeds method as backup (at 27%)

6/13/91 DOWALD presents various geothermal resource evaluation methods to members of Land Board

11/91 MMS new rules are promulgated - changes favor industry and feature additional expenses allowed (e.g. H2S abatement equipment), 2X BBB bond rate multiplier, no 2/3 generating deduction limit

2/92 Board member Chris Yuen expresses interest in royalty issue; inquires if link to price of oil could be factored in

DOWALD enquires of California and Nevada regulators if any royalty calculations are based in part of oil price - no one knew of any examples (MMS uses alternative fuels method for purposes other than electrical generation - space heating, greenhouse, etc.)

early 1992 Steve Morris, now with Constellation Energy (PGV partner) says even under new MMS netback rules (that may yield $0 first few years) PGV will pay some kind of royalty, possibly as an advance against future royalties ($100-150K range)

3/92 MMS provides seminar on new rules; Ormat and Perkins Coie attend (Ormat has projects with federal mining leases that pay royalty under MMS netback method)

4/92 Board Member Chris Yuen's student help assigned study of netback method, DOWALD sends materials

Other

Geothermal Steam Act of 1967 set stage for federal involvement in geothermal

feds began collecting royalties in 1979

Payor Handbook is in preparation by MMS

3/92 seminar on MMS new rules: MMS has 18 projects, royalties $14-16 million

netback method preferred by MMS over percentage of proceeds method

consultant Dan Lum favors percentage of proceeds method as simplest method, least subject to error, favors valuing resource at 100% of electricity revenues (MMS says most negotiated percentages are between 35% -50% though examples exist ranging from 20% to 100%)

MMS administers no by-product royalties at present, but sulfur will be recovered at Geysers for commercial purposes in near future

Valuation Methods in California and Nevada

of 2723 MW of electricity produced, 65% of resource is sold in "arms length" transactions, most by % of proceeds method, balance by $1.--/1000 pounds of steam per hour

35% use "no sales" method (same company produces steam and produces electricity), many use netback method, some use alternative fuels method, Navy uses negotiated percentage of electricity revenues

Source Documents

PGV Geothermal Mining Lease R-2 (Board set royalty rate at

10%)

Administrative Rule 183-31 - provides for royalties to be calculated on value of resource as measured at the wellhead or, if steam is not sold, to establish the value of the resource by some other reasonable method

Statute (HRS 182-18) - board may waive royalty payment up to 8 years

Statute (Act 315, SLH 1991) - DLNR to share royalties: 20% to OHA, 30% to County.

Discussion of Various Royalty Yields for Proposed Methods of Valuing Geothermal Resources

Notes:

1. Geothermal Mining Lease R-2 dated May 16, 1983 fixes the royalty rate at 10% for 35 years. There is, however, no such determination for a method for evaluating geothermal resources in a situation where the resource is not subject to "direct sale", but is used by the lessee to produce electricity in its own power plant which is then sold to an electric utility. Various methods of evaluating the resource produce various values for the resource and therefore different royalty yields for the State.

2. By statute, the Board of Land and Natural Resources may waive royalty payments to the State for any fixed period of time up to but not exceeding eight years.

3. With the adoption of Act 315, SLH 1991, geothermal royalties must be shared with OHA (20%) and the county where the resources are produced (30%). It is unclear as to whether the BLNR can legally waive royalty payments of which a portion has been designated to another agency (i.e. OHA, County).

4. Figures used in the graph and table are from PGV's March 1991 confidential projection.

5. Although the U.S. Department of the Interior Minerals Management Service will not disclose specific examples, it has noted that geothermal lessees usually have resource valuations ranging from 20% to 100% of electricity revenues with many in the 35% to 50% range.

6. In a letter dated December 11, 1990, PGV requested a 60% waiver of royalties for 8 years based on a resource valuation of 33% of gross electricity revenues. A response from DLNR is still pending board action.

7. Inquiries have been made to three geothermal regulators on the mainland as to whether or not examples of geothermal valuation methods exist that reflect and account for fluctuations in the price of oil, which is an important factor in determining electricity revenues received by the developer. To date none have been received, although one regulator thinks there may be one such example in Utah. In general it appears that oil price factors in geothermal valuation methods are not common in the western United States.

PGV 1

This method is known as the "proportion-of-profits" method. It was proposed by PGV in March 1991 as their preferred method of resource valuation. In this method, operating costs for transmission and generation and a steamfield (resource) cost are deducted from gross revenues to calculate operating income. An allocation percentage equal to the percentage of steamfield assets to total capital assets is applied to the operating income. Steamfield costs are then added back to this amount and the resulting figure is the resource value.

Except for the first seven years, this method yields the least royalties to the state over the 35-year projected life of the PGV project.

PGV 2

This method is one of three "percentage of proceeds" methods presented on the graph. It values the resource at 27% of the gross revenues received from the sale of electricity and was proposed by PGV in March 1991 as an alternative to the proportion of profits method presented above.

This method yields the second least royalties to the State over the projected life of the project, except for the first eight years.

PGV 3

This is the second of three "percentage of proceeds" methods presented on the graph. It values the resource at 33% of gross revenues from the sale of electricity and was used by PGV to evaluate the resource in its December 11, 1990 letter to Mr. Paty requesting a 60% royalty waiver for eight years. This request contained slightly different projected figures from PGV's March 1991 figures, but the value of the resource was stated on page 5 as 33% of total electricity revenues generated.

This method yields the third least royalties to the State, except for the first nine years of the project.

Old NB/DPR

The U.S. Department of the Interior Minerals Management Service (MMS) uses either the percentage of proceeds method (such

as PGV 2 and PGV 3) or one of two netback methods: netback depreciation method and netback return on investment method, to evaluate geothermal resource values in situations such as the PGV case where electricity, not the geothermal resource, is sold by the lessee (i.e. no "direct sale").

The Old Netback Depreciation Method deducts the costs of transmission and generaton from the gross electricity revenues, as well as deductions for depreciation of capital and a return on the undepreciated assets based on the average industrial bond rate modified by a multiplication factor. The old method provided a ceiling on generating costs of 2/3 of the tailgate value (gross revenues minus transmission costs).

Only the Old Netback Depreciation Method is presented here since it yields slightly more to the State than the return on investment method. Additionally, since the MMS promulgated the revised rules in November 1991, adopting a new netback depreciation method, the "old" method is presented solely for purposes of comparison.

This method generates the second highest royalties to the State over the project lifetime, giving more than twice the yield of the percent of proceeds methods, except in the first three years.

MMS NB/DPR

The New Netback Depreciation Method adopted by the MMS in November 1991 allows a multiplication factor of 2 to be applied to the industrial bond rate for calculating the return on undepreciated capital. The ceiling on generating costs is eliminated. The new rules also provide additional specifications on which generating and transmission costs are allowable for deduction.

This method yields the third highest royalties to the State except in the first seven years, in which it provides very low yields. It allows for the deduction of costs which are high compared to revenues during the start-up years; these costs are especially high when compared to the first years of the old netback method due to the changing of the bond multiplier.

W.R.A.M.

Water Resource Associates' Method is the third of the three percentage of proceeds methods shown in the graph. Mr. Dan Lum's proposed percentage for valuing the geothermal resource is 100% of electricity revenues. This method was used to calculate royalties for the HGP-A project, and yields the highest royalties to the

State both initially and throughout the life of the project.

Analysis of PGV's Eight Year Waiver Request

PGV has requested a 60% waiver of royalties for the first eight years of operations based on valuing the resource at 33% of electricity revenues. Using their March 1991 figures, this would result in a royalty yield to the State over the first eight years of $1,982,640, instead of $4,956,600 without the waiver.

This yield (with 60% waiver) would be slightly greater (by $262,330) than the yield given by the new netback depreciation method. Thus, the new netback depreciation method gives the developer the greatest assistance in the early years, even without any waiver.

Disadvantages and Advantages of Using the New Netback Method

Disadvantages:

o The New Netback Method is not as simple as the percentage of proceeds methods. It requires detailed operating and capitalization figures from the developer which must be analyzed for deduction eligibility. Several steps are required to compute the value of the resource. Accounting records must be obtained from the developer. An audit function would likely be called for to assure accuracy of supplied figures.

o The overall royalty yield is higher (6.4% of total lifetime revenues) than the yields of the methods proposed by the developer (2.5% to 3.3% of total lifetime revenues). This is likely to be a disadvantage for the developer (though the low yields in the early years would be an advantage).

o Compared to the yield of the WRAM (10% of total lifetime revenues) the lower netback yield is a disadvantage to the State.

Advantages:

o The New Netback Method yield of 6.4% is still relatively high, yielding a total of over $100,000,000 in royalties over the 35-year projected life of the project.

o The New Netback Method requires little or no royalties from the developer in the difficult start up years.

o The New Netback Method provides a high yield after the first eight years.

o The New Netback Method has a long history and extensive

use within the MMS and the geothermal industry, and has recently undergone a lengthy public review and revision process that reflects the thinking of both industry and government.

- The New Netback Method provides a stable valuation method since many factors are accounted for, including average current bond rates and current operating expenses.

- Adopting the New Netback Method would eliminate the need for any waiver of royalties by the board

- Technical assistance is available from the MMS in applying the New Netback Method to State of Hawaii geothermal projects.

STEAM VALUATION FOR ROYALTIES - DIRECT SALE

STEAM SALE CONTRACTS

Method of Payment

$ per 1000 pounds per hour of steam delivered

Range of Prices in the Geysers

$1.60 - $1.80 per 1000 pounds per hour

Annual Resource Value for a 25MW Project (600,000 pounds)

$1.60 - $8,409,600

$1.70 - $8,935,200

$1.80 - $9,460,800

(600,000 pounds X 24 hours X 365 days X $1.60 per 1000 pounds per hour = $8,409,600)

Calculation of Royalty

10% X $8,409,600 = $840,960

10% X $8,935,200 = $893,520

10% X $9,460,800 = $946,080

STEAM VALUATION FOR ROYALTIES - "NO SALES"

PERCENTAGE OF PROCEEDS

Method of Calculation

Allocation of electricity revenues

Range of Percentages Allocated to Steam Value

35% - 50%

Annual Resource Value for a 25 MW Project (600,000 pounds)

35% - $4,139,100

42% - $4,966,920

50% - $5,913,000

(25 MW plant X 90% availability X 24 hours X 365 days X $0.06 per kwh price for electricity X 35% allocated to steam value:

25,000kw X 90% X 24 X 365 X $0.06 X 35% = $4,139,100)

Calculation of Royalty

10% X $4,139,100 = $413,910

10% X $4,966,920 = $496,692

10% X $5,913,000 = $591,300

PROPORTION OF PROFITS METHOD

In this method, proposed by the Geothermal Resources Association, transmission operating costs, generating operating costs, and resource operating costs are subtracted from gross revenues to calculate operating income. To calculate the value of the resource, an allocation percentage is applied to the operating income, and the resource operating costs are added back to that product to arrive at the value of the resource.

The Proportion of Profits method differs radically from the netback method in several regards. First, it allows the deduction of resource operating costs in the calculation of the resource value. These costs are not allowable deductions under the present netback method. Second, this method does not include capital costs of transmission and generation, return on investment, or depreciation and return on undepreciated assets. Third, this method first subtracts resource operating costs from revenues and then adds them back to the resource operating income share to determine the value of the resource. The resource operating income share is based on the premise that the resource (steam) contributes to a proportionate share or percentage of the total assets. In the hypothetical case used here for illustrative purposes, the percentage of resource assets to total assets is 24.45%. This percentage is applied to the operating income to determine the operating income share. Then resource costs are added back to the operating income share to determine the resource value.

Hypothetical figures for 1995 are as follows:

	Dollars($)	Source
Total Revenues	20,000,000	DWRM
Minus		
Transmission Operating Costs	(400,000)	DWRM
Minus		
Generating Operating Costs	(4,000,000)	DWRM
Minus		
Resource Operating Costs	(690,668)	DWRM
Operating Income	14,909,332	DWRM
Resource Operating Income Share (Based on $ 14,909,332 X 24.45%)	3,645,332	DWRM
Plus		
Resource Operating Costs	690,668	DWRM
Resource Value	4,336,000	DWRM
Royalty Amount (Based on 10% of the resource value)	433,600	

NETBACK RETURN ON INVESTMENT METHOD - using no tailgate limit, a multiplication factor of 2.0, and a BBB industrial bond rate of 9.5% (figures from PGV 3/91)

1992 Transmission Costs	
Operation and Maintenance	170,000
Annual return on Allowable Capital Investment ($7,00,000 X 9.5% X 2.00)	1,330,000
Total	1,500,000
1992 Generating Costs	
Operation and Maintenance	3,634,000
Annual return on Allowable Capital Investment ($60,165,000 X 9.5% X 2.0)	11,431,350
Total	$15,065,350
1992 Total Revenues	16,469,000
minus	
1992 Transmission Deduction	1,500,000
1992 Tailgate Value of Electricity	14,969,000
1992 Generating Deduction	15,065,350
Value of the Geothermal Resource	0
1992 Royalty Amount (10% of resource value)	0

NETBACK DEPRECIATION METHOD - using no tailgate limit, a multiplication factor of 2.0, and a BBB industrial bond rate of 9.5% (figures from PGV 3/91)

1992 Transmission Costs	
Operation and Maintenance	170,000
Depreciation (35 year s.l.)	200,000
Interest on Undepreciated Balance ($6,800,000 X 9.5% X 2.00)	1,292,000
Total	1,662,000
1992 Generating Costs	
Operation and Maintenance	3,634,000
Depreciation (35 year s.l.)	1,719,000
Interest on Undepreciated Balance ($58,446,000 X 9.5% X 2.0)	11,104,740
Total	$16,457,740
1992 Total Revenues	16,469,000
minus	
1992 Transmission Deduction	1,662,000
1992 Tailgate Value of Electricity	14,807,000
1992 Generating Deduction	16,457,740
Value of the Geothermal Resource	0
1992 Royalty Amount (10% of resource value)	0

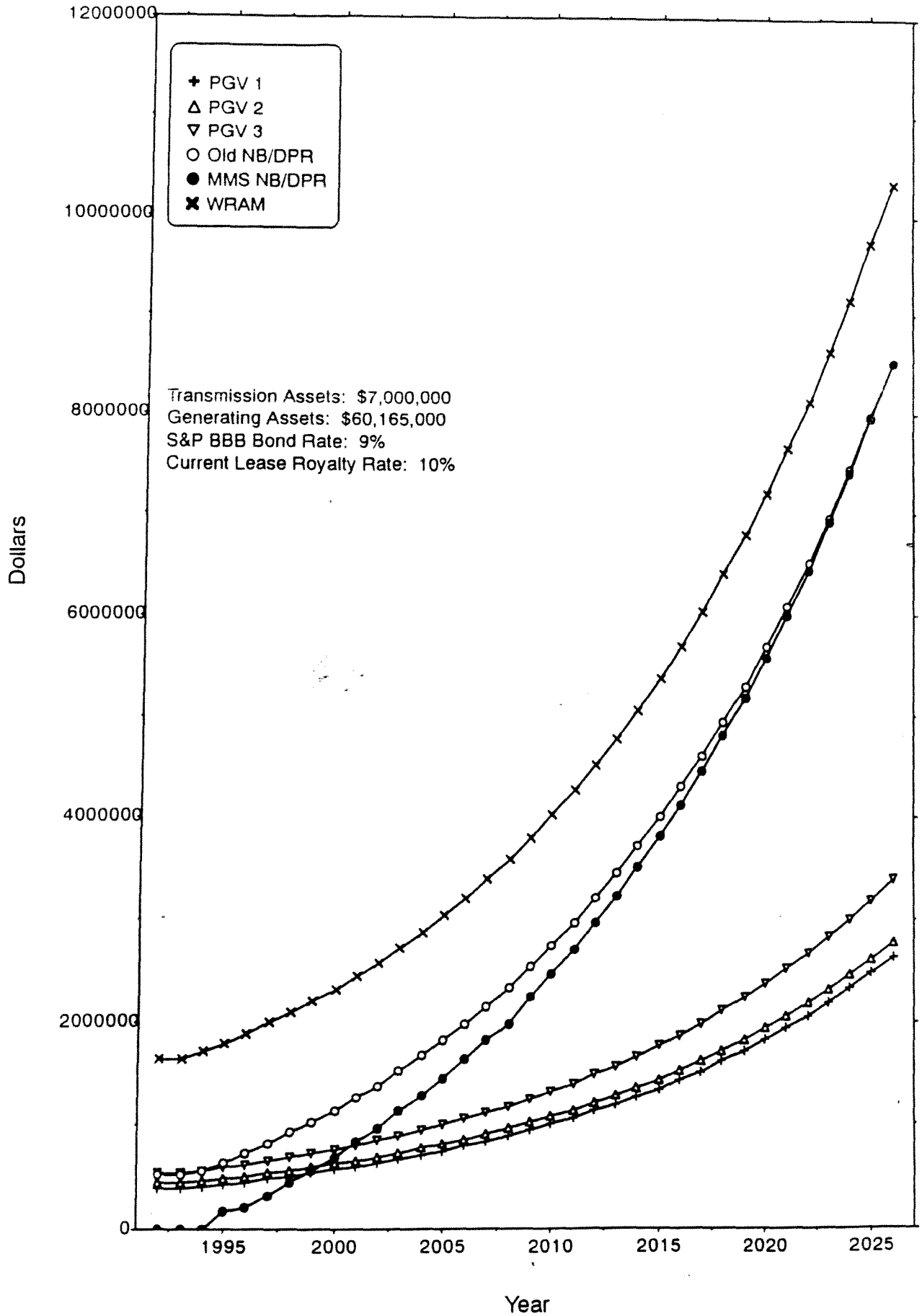
NETBACK RETURN ON INVESTMENT METHOD - using no tailgate limit, a multiplication factor of 2.0, and a BBB industrial bond rate of 8.0% (figures from PGV 3/91)

1992 Transmission Costs	
Operation and Maintenance	170,000
Annual return on Allowable Capital Investment ($7,00,000 X 8.0% X 2.00)	1,120,000
Total	1,290,000
1992 Generating Costs	
Operation and Maintenance	3,634,000
Annual return on Allowable Capital Investment ($60,165,000 X 8.0% X 2.0)	9,626,400
Total	$13,260,400
1992 Total Revenues	16,469,000
minus	
1992 Transmission Deduction	1,290,000
1992 Tailgate Value of Electricity	15,179,000
1992 Generating Deduction	13,260,400
Value of the Geothermal Resource	1,918,600
1992 Royalty Amount (10% of resource value)	191,860

NETBACK DEPRECIATION METHOD - using no tailgate limit, a multiplication factor of 2.0, and a BBB industrial bond rate of 8.0% (figures from PGV 3/91)

1992 Transmission Costs	
Operation and Maintenance	170,000
Depreciation (35 year s.l.)	200,000
Interest on Undepreciated Balance ($6,800,000 X 8.0% X 2.00)	1,088,000
Total	1,458,000
1992 Generating Costs	
Operation and Maintenance	3,634,000
Depreciation (35 year s.l.)	1,719,000
Interest on Undepreciated Balance ($58,446,000 X 8.0% X 2.0)	9,351,360
Total	$14,704,360
1992 Total Revenues	16,469,000
minus	
1992 Transmission Deduction	1,458,000
1992 Tailgate Value of Electricity	15,011,000
1992 Generating Deduction	14,704,360
Value of the Geothermal Resource	306,640
1992 Royalty Amount (10% of resource value)	30,664

Royalty Yields for Proposed Methods of Valuing Geothermal Resource



Recommendations to the Division of Water Resource Management

The Division of Water Resource Management ("DWRM") has specifically asked that I recommend an appropriate method to be used in determining the value of geothermal resource. While positive arguments can be made for each of the methods described in this report, none of the methods is universally accepted as being the best method or the most appropriate method.

Based on my review of the methods being used in the industry, I believe it is in the best interest of the DWRM to use the netback valuation method that is being used by the MMS to value geothermal resources produced from Federal leases. I believe the netback method is logical, it can be applied consistently to all DWRM projects and the MMS has spent considerable time and effort to develop a method that protects the interest of the resource owner without being unfair to the developer. Following the lead of the MMS provides DWRM with an established, supportable and consistent method of valuing geothermal resources.

In addition, although the netback method requires a considerable amount of information about the cost and operating expenses of the power plant, it is a reasonably simply valuation process.

I also recommend that new leases provide for a specific method of valuing geothermal resources in the event of a "no sale" or non arms-length sale of the resource. Adding this type of provision should also be considered as a part of any lease renegotiations or extensions.

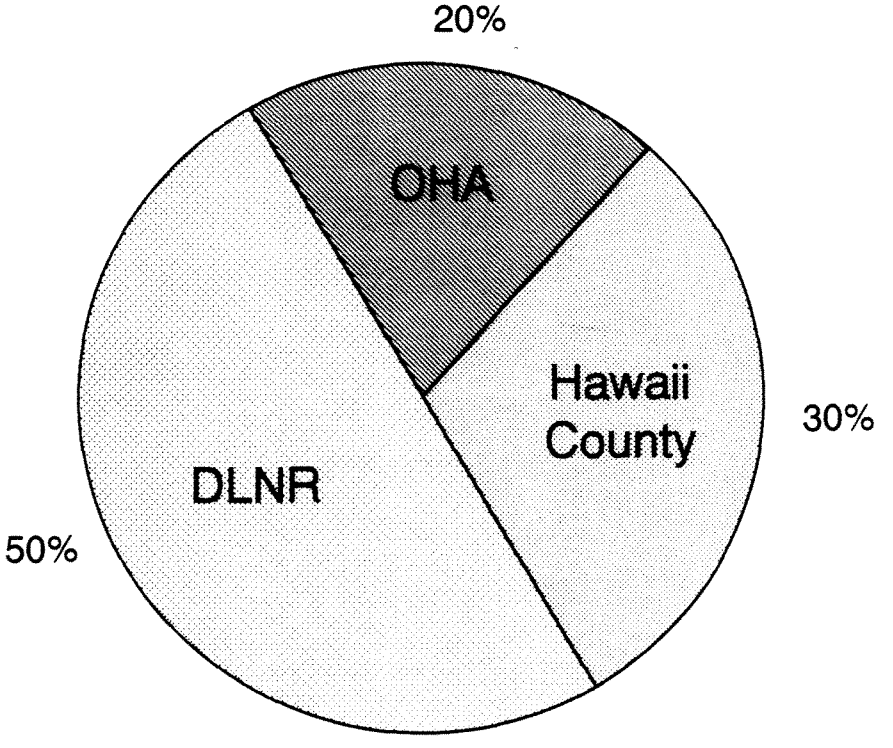
GEOTHERMAL ROYALTIES

AUTHORITY

- Administrative Rules, Ch. 183, Section 31
  - Board determines:
    - royalty rate
    - resource valuation method
- Hawaii Revised Statues, Ch. 182, Section 18
  - Board may waive royalty up to 8 years
- Act 315, SLH 1991
  - Geothermal royalties to be shared

ROYALTY SHARING

Board must share royalty



ROYALTY CALCULATION

Royalty = Royalty Rate x Resource Value

ROYALTY RATE

Royalty Rate = 10%

(Set by Board in Mining Leases)

RESOURCE VALUATION

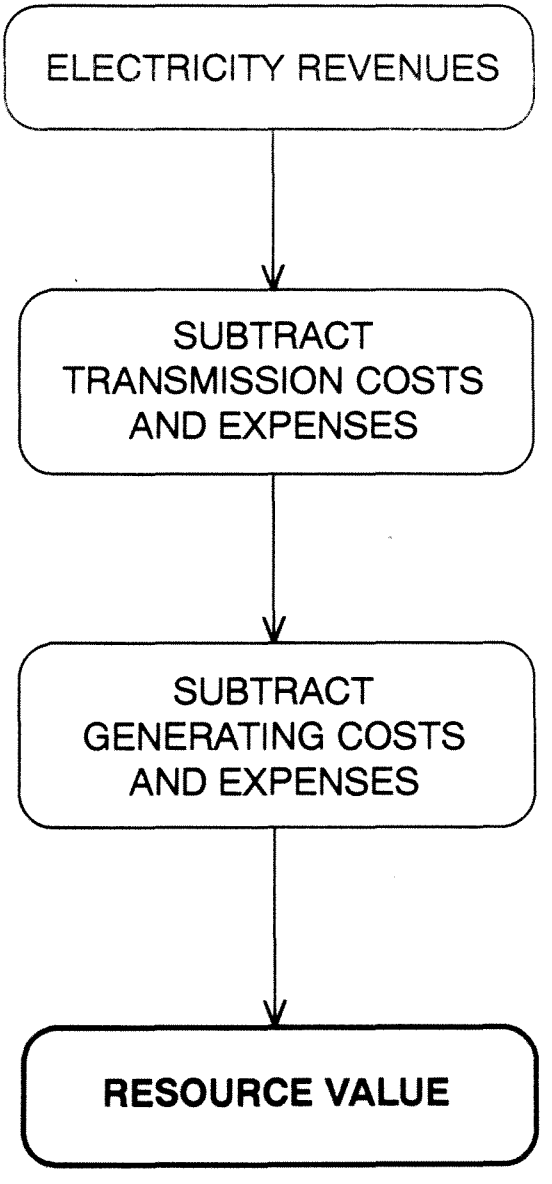
In "No-sales" situation resource value can be calculated by using:

- Percentage of proceeds method
- Netback method

PERCENTAGE OF PROCEEDS METHOD

Electricity revenues x Negotiated % = Resource Value

NETBACK METHOD



PGV ROYALTY PROPOSAL

PGV has submitted the following Percentage of Proceeds proposals:

1. 33% of revenues with a 60% waiver of royalties for the first 8 years.

2. 27% of revenues for 35 years.

ROYALTY YIELDS FOR PGV PROPOSALS, 25MW DELIVERY

Year	Projected Revenue	33% (1)	27%
1993	16,469,000	326,000	445,000
1994	16,469,000	326,000	445,000
1995	17,195,000	340,000	464,000
1996	18,056,000	358,000	488,000
1997	18,973,000	376,000	512,000
1998	19,950,000	395,000	539,000
1999	20,990,000	416,000	567,000
2000	22,098,000	437,000	597,000
2001	23,279,000	768,000	629,000
2002	24,535,000	810,000	662,000
2003	25,874,000	854,000	699,000
2004	27,299,000	901,000	737,000
2005	28,817,000	951,000	778,000
2006	30,434,000	1,004,000	822,000
2007	32,156,000	1,061,000	868,000
2008	33,990,000	1,122,000	918,000
2009	35,943,000	1,186,000	970,000
2010	38,022,000	1,255,000	1,027,000
2011	40,238,000	1,328,000	1,086,000
2012	42,597,000	1,406,000	1,150,000
2013	45,109,000	1,489,000	1,218,000
2014	47,785,000	1,577,000	1,290,000
2015	50,634,000	1,671,000	1,367,000
2016	53,669,000	1,771,000	1,449,000
2017	56,901,000	1,878,000	1,536,000
2018	60,344,000	1,991,000	1,629,000
2019	64,010,000	2,112,000	1,728,000
2020	67,914,000	2,241,000	1,834,000
2021	72,072,000	2,378,000	1,946,000
2022	76,500,000	2,525,000	2,066,000
2023	81,216,000	2,680,000	2,193,000
2024	86,239,000	2,846,000	2,328,000
2025	91,588,000	3,022,000	2,473,000
2026	97,285,000	3,210,000	2,627,000
2027	103,352,000	3,411,000	2,790,000
Totals-->	1,588,002,000	50,422,000	42,877,000

NOTES: 1) 60% waiver for first 8 years and 33% of revenue thereafter

DLNR STAFF PROPOSAL

Utilize Netback Method

ROYALTY YIELD - NETBACK METHOD, 25MW DELIVERY

Year	Projected Revenue	NETBACK
1993	16,469,000	0
1994	16,469,000	0
1995	17,195,000	0
1996	18,056,000	163,000
1997	18,973,000	214,000
1998	19,950,000	327,000
1999	20,990,000	445,000
2000	22,098,000	571,000
2001	23,279,000	699,000
2002	24,535,000	835,000
2003	25,874,000	981,000
2004	27,299,000	1,135,000
2005	28,817,000	1,297,000
2006	30,434,000	1,468,000
2007	32,156,000	1,644,000
2008	33,990,000	1,834,000
2009	35,943,000	1,985,000
2010	38,022,000	2,252,000
2011	40,238,000	2,480,000
2012	42,597,000	2,711,000
2013	45,109,000	2,977,000
2014	47,785,000	3,241,000
2015	50,634,000	3,521,000
2016	53,669,000	3,817,000
2017	56,901,000	4,125,000
2018	60,344,000	4,458,000
2019	64,010,000	4,811,000
2020	67,914,000	5,185,000
2021	72,072,000	5,582,000
2022	76,500,000	5,995,000
2023	81,216,000	6,442,000
2024	86,239,000	6,917,000
2025	91,588,000	7,422,000
2026	97,285,000	7,958,000
2027	103,352,000	8,517,000
Totals-->	1,588,002,000	102,009,000

ROYALTY YIELDS FOR VARIOUS VALUATIONS, 25MW DELIVERY

Year	Projected Revenue	27%	33% (1)	NETBACK (2)
1993	16,469,000	445,000	326,000	0
1994	16,469,000	445,000	326,000	0
1995	17,195,000	464,000	340,000	0
1996	18,056,000	488,000	358,000	163,000
1997	18,973,000	512,000	376,000	214,000
1998	19,950,000	539,000	395,000	327,000
1999	20,990,000	567,000	416,000	445,000
2000	22,098,000	597,000	437,000	571,000
2001	23,279,000	629,000	768,000	699,000
2002	24,535,000	662,000	810,000	835,000
2003	25,874,000	699,000	854,000	981,000
2004	27,299,000	737,000	901,000	1,135,000
2005	28,817,000	778,000	951,000	1,297,000
2006	30,434,000	822,000	1,004,000	1,468,000
2007	32,156,000	868,000	1,061,000	1,644,000
2008	33,990,000	918,000	1,122,000	1,834,000
2009	35,943,000	970,000	1,186,000	1,985,000
2010	38,022,000	1,027,000	1,255,000	2,252,000
2011	40,238,000	1,086,000	1,328,000	2,480,000
2012	42,597,000	1,150,000	1,406,000	2,711,000
2013	45,109,000	1,218,000	1,489,000	2,977,000
2014	47,785,000	1,290,000	1,577,000	3,241,000
2015	50,634,000	1,367,000	1,671,000	3,521,000
2016	53,669,000	1,449,000	1,771,000	3,817,000
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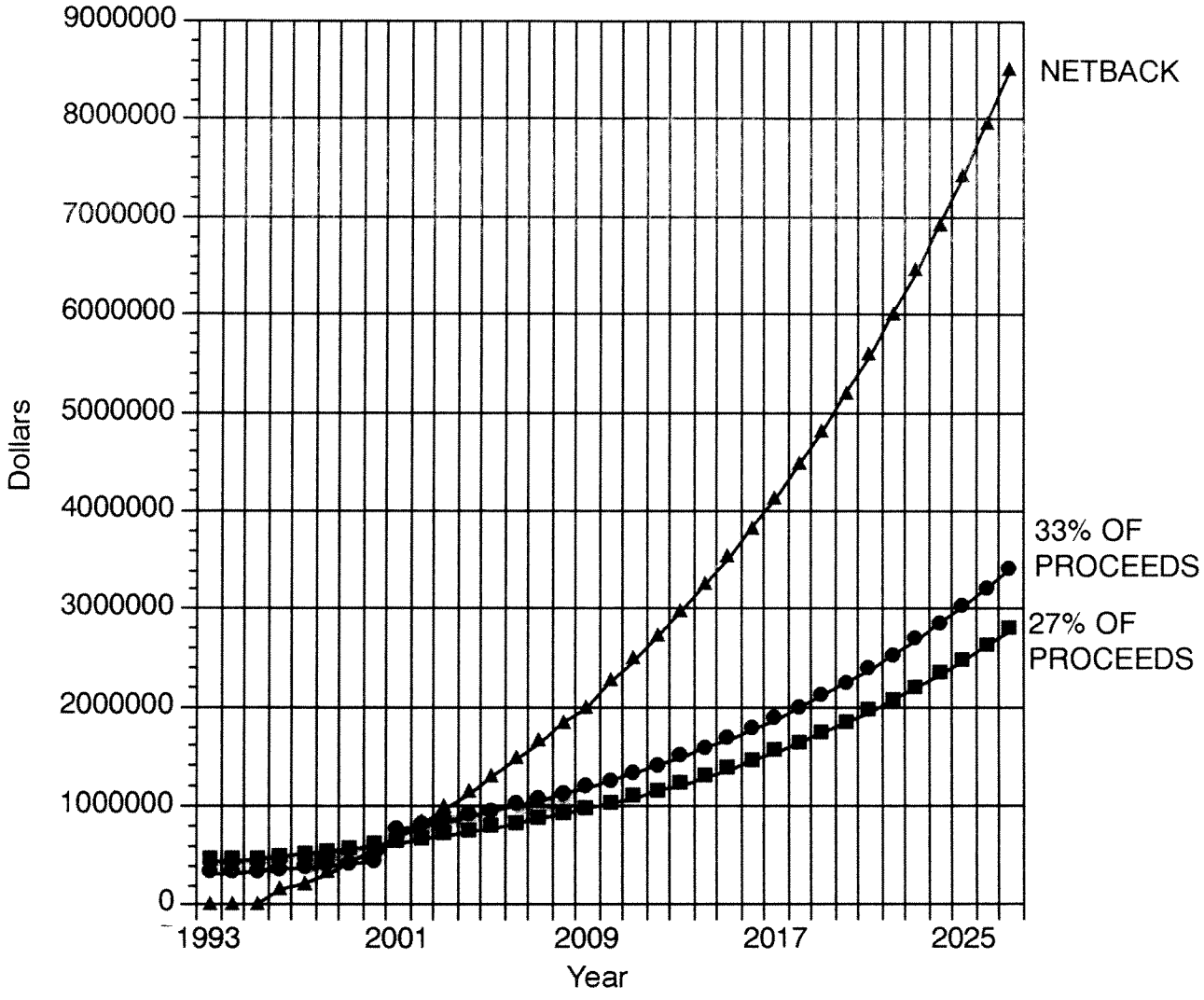
2025	91,588,000	2,473,000	3,022,000	7,422,000
2026	97,285,000	2,627,000	3,210,000	7,958,000
2027	103,352,000	2,790,000	3,411,000	8,517,000
Totals-->	1,588,002,000	42,877,000	50,422,000	102,009,000

NOTES: 1) 60% waiver for first 8 years and 33% of revenue thereafter

2) Netback depreciation method using 2 x S&P BBB bond rate of 9%

ROYALTY YIELDS FOR VARIOUS VALUATIONS



COMPARISON OF METHODS

NETBACK

PRO	CON
Fair; protects state interests Recognizes developer risks Reflects actual developer costs Industry-accepted Simple to calculate Yields most royalties (long term) Eliminates need for waiver Applies to all developments	Cost and expense info required Yields vary with bond rate

PERCENTAGE OF PROCEEDS

PRO	CON
Simple to calculate	Arbitrary Lower yields (long term) May require separate negotiations

RECOMMENDATION

That the Board authorize the Division to proceed to use the netback method to calculate the value of geothermal resources used in the production of electricity in "no sales" situations, and authorize the Chairperson to sign the appropriate documents requiring the lessee to submit the required financial statements, and that the Board authorize the Chairperson to modify the federal method as appropriate for State of Hawaii use.

REFERENCES

- Minerals Management Service CFR Vol. 56, No. 217
  November 8, 1991
- Richard Thomas, Regulator, State of California
- George Frye, Regulator, State of California
- State of Hawaii Mining Leases R-1, R-2, R-3. R-4, R-5, S-4602
- Consultant Steve Morris
- Consultant Dan Lum
- Comments of the Geothermal Resources Association on Proposed Revisions of Geothermal Resources Valuation Regulations and Related Topics Submitted to Minerals Management Service
- PUC Dockets 6498, 5525